



A

King Abdul Aziz University
Faculty of science
Chemistry department

Model (A)

Chem.110

Second exam of 1st term 1432-1433H

Time: 90 minutes

| | |
|-----------------------|--|
| Student name: | |
| Student number | |
| Section | |

Useful information

Speed of light, $c = 3.0 \times 10^8$ m/s

Planck's const., $h = 6.626 \times 10^{-34}$ J.s

Avogadro's No., $N_{av} = 6.022 \times 10^{23}$ mol⁻¹

Rydberg const. for H atom $R_H = 2.179 \times 10^{-18}$ J

Gas constant $R = 0.082$ L atm K⁻¹ mol⁻¹ = 8.314 JK⁻¹mol⁻¹

1 atm = 760 mmHg = 1.01325×10^5 Pa

With the best wishes

General Chemistry Team work

Directions: For each of the following questions, choose the letter that **best** answers the question and place it on your answer sheet.

- Which of the following exist as monatomic gas
 - He
 - O
 - F
 - Cl
- Which of the following pressure values is the smallest?
 - 635 mmHg
 - 0.677 atm
 - 550 torr
 - 1.8×10^4 Pa
- Under constant-pressure conditions a sample of hydrogen gas at 134.0°C and 7.0 L is cooled to a final volume 2.0 L. What is its final temperature?
 - 4.163×10^2 K
 - 2.163×10^2 K
 - 3.163×10^2 K
 - 1.163×10^2 K
- A sample of oxygen occupies 1236.0 liters under a pressure of 6.03 mmHg at 25°C . What volume would it occupy at 25°C if the pressure were changed to 1.8 atm?
 - 8.448 L
 - 2.448 L
 - 5.448 L
 - 1.448 L
- The volume of a sample of nitrogen is 5.6 liters at 35°C and 0.970 atm. What volume will it occupy at STP?
 - 4.815 L
 - 7.815 L
 - 0.815 L
 - 6.815 L
- What is the density of Hydrogen (H_2) gas at STP?
 - 0.089 g L^{-1}
 - 2.089 g L^{-1}
 - 3.089 g L^{-1}
 - 1.089 g L^{-1}

A

7. A mixture of gases contains 13 g of H_2 and 11 g of He. Calculate the partial pressure of the He gas if the total pressure is 4.25 atm.

- a) 1.260 atm
- b) 4.062 atm
- c) 2.062 atm
- d) 5.062 atm

8. Calculate the volume of PH_3 at $20^\circ C$ and 775.0 mmHg that can be prepared by addition of a water to 1.48 g of Ca_3P_2 . $Ca_3P_{2(s)} + 6H_2O_{(l)} = 3Ca(OH)_{2(s)} + 2PH_{3(g)}$

- a) 387.19 ml
- b) 364.72 ml
- c) 361.72 ml
- d) 383.19 ml

9. What is the wavelength (λ) of radiation that has a frequency of 70.3×10^{14} Hz?

- a) 0.04×10^{-4} cm
- b) 0.04×10^{-5} cm
- c) 0.24×10^{-5} cm
- d) 0.24×10^{-4} cm

10. What is the frequency of radiation having a wavelength of 489.5 nm?

- a) 6.13×10^{14} Hz
- b) 6.43×10^{12} Hz
- c) 6.13×10^{12} Hz
- d) 6.43×10^{14} Hz

11. What is the energy of ultraviolet light, if the wavelength of this radiation is 45.5 nm?

- a) 0.64×10^{-17} J
- b) 0.44×10^{-17} J
- c) 0.44×10^{-18} J
- d) 4.37×10^{-18} J

12. In what group would an element of atomic number 31 be placed?

- a) group 5A
- b) group 1A
- c) group 2A
- d) group 3A

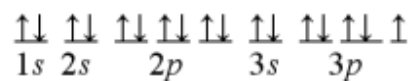
13. Which of the following elements is an s-block element?

- a) Fe
- b) Na
- c) Br
- d) N

A

14. Which of the following elements has the smallest radius?
- Br
 - F
 - I
 - Cl
15. Which of the following has the largest radius?
- S^{2-}
 - Cl^{-}
 - Ar
 - K^{+}
16. A possible set of quantum numbers for the last electron added to complete an atom of platinum (Pt) in its ground state is
- $n = 2, \ell = 2, m_l = 0, m_s = +\frac{1}{2}$
 - $n = 3, \ell = 0, m_l = 0, m_s = -\frac{1}{2}$
 - $n = 3, \ell = 1, m_l = -1, m_s = -\frac{1}{2}$
 - $n = 5, \ell = 2, m_l = +1, m_s = +\frac{1}{2}$
17. The number of valence electrons in Aluminum atom (Al) is _____.
- 3
 - 6
 - 4
 - 5
18. Which of the following elements has the lowest electron affinity?
- B
 - C
 - Be
 - Li
19. Which of the following elements has the highest first ionization energy?
- As
 - Ga
 - Br
 - Ca
20. Rank the following elements in order of increasing atomic size: F, P, Mg, Cs
- $Cs < Mg < F < P$
 - $F < P < Mg < Cs$
 - $Cs < F < Mg < P$
 - $P < Mg < F < Cs$

21. The following orbital diagram corresponds to the element _____.



- a) P
- b) Si
- c) Br
- d) Cl

22. Which of these elements has the *greatest* electronegativity?

- a) N
- b) F
- c) O
- d) C

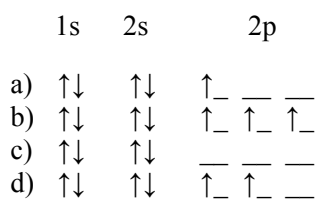
23. The element that has the electron configuration $[\text{Ne}] 3s^2 3p^1$ is:

- a) Al
- b) Si
- c) P
- d) Cl

24. What is the total number of orbital's associated with the $n = 2$ level?

- a) 9
- b) 6
- c) 3
- d) 4

25. Which of the following electronic configurations represents a diamagnetic atom?



26. How many unpaired electrons are in the ground state electron configuration of an oxygen atom?

- a) 1
- b) 2
- c) 3
- d) 5

27. Which of the following is *isoelectronic* with Ne

- a) Ca^{2+}
- b) K^+
- c) Na^+
- d) Ar

28. Which of the following is the electron configuration for a titanium atom, Ti?

- a) $[\text{Ar}] 3d^2$
- b) $[\text{Ar}] 4s^2 3d^2$
- c) $[\text{Ar}] 4d^2$
- d) $[\text{Ar}] 4s^2 4d^2$

29. The electron configuration of chromium (ii) ion (Cr^{+2}) is

- a) $[\text{Ar}] 3d^4$
- b) $[\text{Ar}] 4s^2 3d^2$
- c) $[\text{Ar}] 4s^1 3d^5$
- d) $[\text{Ar}] 4s^2 3d^4$

30. What is the Lewis dot structure of element with atomic number 5 ($z=5$)

- a) $\cdot\ddot{\text{X}}\cdot$
- b) $\cdot\text{X}\cdot$
- c) $\cdot\ddot{\text{X}}\cdot$
- d) $\cdot\dot{\text{X}}\cdot$

| | | | | | | | | | | | | | | | | | | | |
|---------------------------------------|--|---------------------------------------|---|--|--|---|--|--------------------------------------|---|--|---------------------------------------|--|---------------------------------------|---|--|---------------------------------------|--------------------------------------|-----------------------------------|--|
| hydrogen 1 H 1.0079 | | | | | | | | | | | | | | | | | helium 2 He 4.0026 | | |
| lithium 3 Li 6.941 | beryllium 4 Be 9.0122 | | | | | | | | | | | boron 5 B 10.811 | carbon 6 C 12.011 | nitrogen 7 N 14.007 | oxygen 8 O 15.999 | fluorine 9 F 18.998 | neon 10 Ne 20.180 | | |
| sodium 11 Na 22.990 | magnesium 12 Mg 24.305 | | | | | | | | | | | aluminium 13 Al 26.982 | silicon 14 Si 28.086 | phosphorus 15 P 30.974 | sulfur 16 S 32.065 | chlorine 17 Cl 35.453 | argon 18 Ar 39.948 | | |
| potassium 19 K 39.098 | calcium 20 Ca 40.078 | scandium 21 Sc 44.956 | titanium 22 Ti 47.867 | vanadium 23 V 50.942 | chromium 24 Cr 51.996 | manganese 25 Mn 54.938 | iron 26 Fe 55.845 | cobalt 27 Co 58.933 | nickel 28 Ni 58.693 | copper 29 Cu 63.546 | zinc 30 Zn 65.39 | gallium 31 Ga 69.723 | germanium 32 Ge 72.61 | arsenic 33 As 74.922 | selenium 34 Se 78.96 | bromine 35 Br 79.904 | krypton 36 Kr 83.80 | | |
| rubidium 37 Rb 85.468 | strontium 38 Sr 87.62 | yttrium 39 Y 88.906 | zirconium 40 Zr 91.224 | niobium 41 Nb 92.906 | molybdenum 42 Mo 95.94 | technetium 43 Tc [98] | ruthenium 44 Ru 101.07 | rhodium 45 Rh 102.91 | palladium 46 Pd 106.42 | silver 47 Ag 107.87 | cadmium 48 Cd 112.41 | indium 49 In 114.82 | tin 50 Sn 118.71 | antimony 51 Sb 121.76 | tellurium 52 Te 127.60 | iodine 53 I 126.90 | xenon 54 Xe 131.29 | | |
| caesium 55 Cs 132.91 | barium 56 Ba 137.33 | 57-70 * | lutetium 71 Lu 174.97 | hafnium 72 Hf 178.49 | tantalum 73 Ta 180.95 | tungsten 74 W 183.84 | rhenium 75 Re 186.21 | osmium 76 Os 190.23 | iridium 77 Ir 192.22 | platinum 78 Pt 195.08 | gold 79 Au 196.97 | mercury 80 Hg 200.59 | thallium 81 Tl 204.38 | lead 82 Pb 207.2 | bismuth 83 Bi 208.98 | polonium 84 Po [209] | astatine 85 At [210] | radon 86 Rn [222] | |
| francium 87 Fr [223] | radium 88 Ra [226] | 89-102 * * | lawrencium 103 Lr [262] | rutherfordium 104 Rf [261] | dubnium 105 Db [262] | seaborgium 106 Sg [266] | bohrium 107 Bh [264] | hassium 108 Hs [269] | meitnerium 109 Mt [268] | ununnium 110 Uun [271] | ununium 111 Uuu [272] | ununbium 112 Uub [277] | | ununquadium 114 Uuq [289] | | | | | |

* Lanthanide series

| | | | | | | | | | | | | | |
|--|--------------------------------------|---|--|--|---------------------------------------|---------------------------------------|---|---------------------------------------|---|---|--------------------------------------|--|--|
| lanthanum 57 La 138.91 | cerium 58 Ce 140.12 | praseodymium 59 Pr 140.91 | neodymium 60 Nd 144.24 | promethium 61 Pm [145] | samarium 62 Sm 150.36 | europium 63 Eu 151.96 | gadolinium 64 Gd 157.25 | terbium 65 Tb 158.93 | dysprosium 66 Dy 162.50 | holmium 67 Ho 164.93 | erbium 68 Er 167.26 | thulium 69 Tm 168.93 | ytterbium 70 Yb 173.04 |
| actinium 89 Ac [227] | thorium 90 Th 232.04 | protactinium 91 Pa 231.04 | uranium 92 U 238.03 | neptunium 93 Np [237] | plutonium 94 Pu [244] | americium 95 Am [243] | curium 96 Cm [247] | berkelium 97 Bk [247] | californium 98 Cf [251] | einsteinium 99 Es [252] | fermium 100 Fm [257] | mendelevium 101 Md [258] | nobelium 102 No [259] |

* * Actinide series